

C. Lin et al.
U.S. Serial No. 10/690,921
Page 5 of 7

REMARKS

Claims 1-16 and 18 are pending in the application. Claims 1 and 18 have been amended by the present amendment. Claim 1 has been amended to incorporate subject matter of claim 17, which has been canceled without prejudice, and subject matter of claim 18, which has been amended in accordance with amended claim 1. The amendments are fully supported by the application as originally filed.

Applicants' claimed invention is directed to a semiconductor package with a heat sink. As recited in claim 1, the heat sink comprises a flat portion attached to a chip, a support portion extending from an edge of the flat portion to a substrate, and a bonding portion extending laterally from an end of the support portion and connected to the substrate. For example, as shown in FIG. 1 of the application, heat sink 50 includes flat portion 51 attached to chip 40, support portion 52, and bonding portion 53.

As amended, claim 1 recites at least one slot formed through the bonding portion of the heat sink, where the slot has at least one of a taper structure and a bent inner wall. For example, as shown in FIGS. 7A and 7B, an inner wall of the slot forms a taper structure 554 (see FIG. 7A) or is bent to form a stepped structure 654 (see FIG. 7B) (see also specification at page 10, third paragraph).

Applicants' claimed invention can provide significant benefits. By providing the taper structure or the bent inner wall as claimed, contact area is increased between the bonding portion and an adhesive material used for attaching the heat sink to the substrate, such that bonding strength between the heat sink and the substrate can be improved (see specification at page 10, third paragraph), and thermal stresses generated therebetween can be alleviated and released via the slot (see, e.g., page 10, first paragraph).

C. Lin et al.
U.S. Serial No. 10/690,921
Page 6 of 7

Claims 1-18 were rejected under 35 USC 103(a) as being unpatentable over U.S. Patent 6,538,320 to Tosaya et al. ("Tosaya") in view of U.S. Patent 5,956,576 to Toy et al. ("Toy"). This rejection is respectfully traversed.

As amended, independent claim 1 incorporates subject matter of claims 17 and 18.

The proposed combination of Tosaya in view of Toy does not teach or suggest a heat sink including a bonding portion formed with a slot having "at least one of a taper structure and a bent inner wall," as recited in claim 1.

On page 4 of the Office Action, it was stated: "Tosaya et al further teaches that said slots may have varying shapes (see col. 2, lines 55-56) and therefore obviously including any shape which allows for the riveting anchoring effect..."

Referring to FIG. 4 of Tosaya, a heat spreader 102 has a flange 108 with a plurality of holes 110 extending through the flange 108 (see column 2, lines 43-45). As stated in column 2, lines 52-54, "[t]he diameter of the holes 110 preferably comprises approximately fifty percent of the width of the flange 108." The selected hole size "provides a secure connection when filled with adhesive" (column 2, lines 54-55 of Tosaya).

In other words, Tosaya provides a secure connection by controlling the diameter of the holes 110 relative to the width of the flange 108 (see column 2, lines 52-55).

However, Tosaya does not teach or suggest an arrangement in which the holes 110 have either a taper structure or a bent inner wall, as recited in claim 1. There is no teaching or suggestion in Tosaya to taper or bend the inner walls of the holes 110 to increase contact area between the heat sink and adhesive material.

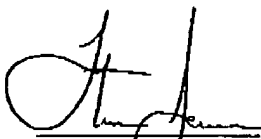
Similarly, the Toy reference does not teach or suggest a heat sink including a bonding portion with a slot having at least one of a taper structure and a bent inner wall.

C. Lin et al.
U.S. Serial No. 10/690,921
Page 7 of 7

Therefore, Toy cannot remedy the deficiencies of Tosaya, and the proposed combination does not teach or suggest the Applicants' claimed invention.

It is believed the application is in condition for immediate allowance, which action is earnestly solicited.

Respectfully submitted,



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